Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands and 14.0-14.5 GHZ/11.7-12.2 GHz Bands	)	IB Docket No. 02-10

NOTICE OF PROPOSED RULE MAKING

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Comment Date: 30 days after Federal Register publication
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By the Commission:

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Heading Paragraph #

I. INTRODUCTION

1. Earth stations onboard vessels (ESVs) can be used to provide broadband telecommunications services on passenger, government, cargo, and large recreational vessels. In this Notice of Proposed Rulemaking (*Notice*), we make proposals and seek comment on a regulatory framework for licensing the operation of ESVs in fixed-satellite service (FSS) networks in the 5925-6425 MHz/3700-4200 MHz (C-Band)[1] and 14.0-14.5 GHz/11.7-12.2 GHz (Ku-Band)[2] frequencies. Our goal is to promote more efficient use of the spectrum while protecting and providing regulatory certainty to the existing primary allocations, including the fixed service (FS) and fixed satellite service (FSS) operators, and protection to stations of the secondary Government space research (SRS) and radio astronomy (RAS) operations in these frequency bands. Our proposals would enable important new communications services to be provided to consumers on board vessels. They would also protect existing terrestrial FS and FSS operations from harmful interference from ESVs and allow for future growth of FS and FSS networks. With regard to the secondary Government space research stations and radio astronomy operations in parts of the Ku-Band, our proposals would provide protection to the existing and future stations of these national assets.

2. As part of this rulemaking, we seek to implement, in part, in the United States the decision reached at the International Telecommunication Union's (ITU's) 2003 World Radiocommunication Conference (WRC-03) to add a footnote to the International Table of Frequency Allocations stating that in the 5925-6425 MHz and 14.0-14.5 GHz bands ESVs may communicate with space stations in the

[1] For purposes of this *Notice*, "standard" C-band refers to frequencies in the 3700-4200 MHz (downlink) and 5925-6425 MHz (uplink) bands and excludes the so-called "extended C-band" at 3650-3700 MHz, 5850-5925 MHz, and 6425-6700 MHz. The C-bands are allocated on a co-primary basis to both the Fixed Service (FS) and Fixed-Satellite Service (FSS). *See generally* 47 C.F.R. § 2.106.

[2] For purposes of this *Notice*, the "standard" Ku-band refers to frequencies in the 11.7-12.2 GHz (downlink) and 14.0-14.5 GHz (uplink) bands and excludes the so-called "extended Ku-band" at 12.75-13.25 GHz, 13.75-14.0 GHz, 10.7-10.95 GHz, 10.95-11.2 GHz, 11.2-11.45 GHz, and 11.45-11.7GHz. The "standard" Ku-bands are allocated on a primary basis to the FSS. *See generally* 47 C.F.R. § 2.106.

FSS.[3] The decision permits the operation of ESVs in these bands with specific conditions. Our proposals seek to address these conditions as well as other conditions that may be appropriate to ESV operations in the United States. The ITU also encourages administrations to cooperate with each other in reaching agreement on the use of ESV systems.[4] To that end, our proposals seek to establish a regulatory scheme that could enable foreign-licensed ESVs to operate near the United States coastline without causing harmful interference to domestic operations.

3. Moving forward with approaches to license ESVs in the C-band and Ku-band also advances the Commission's goals and objectives for market-driven deployment of broadband technologies and efficient spectrum usage. Broadband technologies, which encompass all evolving high-speed digital technologies that provide consumers integrated access to voice, high-speed data, video-on-demand, and interactive delivery services, are a fundamental component of modern communications.[5] Fully evolved digital broadband will virtually eliminate geographic distance as an obstacle to acquiring information, and dramatically reduce the time it takes to access information. Consumers benefit as broadband technologies are developed and deployed. ESVs potentially offer consumers the benefits of broadband services while on vessels both in port[6] and en route between ports.[7] To this end, this Notice responds to an emerging marketplace need by potentially permitting more flexible use of the C-band and Ku-band while protecting existing services from harmful interference.[8]

4. In the *Notice of Inquiry* of this proceeding, the Commission solicited comments on a variety of issues related to the authorization of satellite earth stations on board vessels.[9] ESVs previously have been authorized through waivers and Special Temporary Authority (STA) authorizations. The Commission, in its *Notice of Inquiry*, indicated that authorizing ESVs on a more clearly-defined basis, through the adoption of specific rules governing their use, may benefit users and service providers by creating regulatory certainty.[10] In view of the fact that there are existing terrestrial fixed users in some of

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[3] ITU Radio Regulations (RR) N. 5.457A (WRC-03), effective July 5, 2003. This footnote requires that such use be in accordance with ITU Resolution 902.

[4] ITU-R Resolution 902 (WRC-03).

[5] *See* Federal Communications Commission Strategic Plan FY 2003-FY 2008, page 10, Means and Strategies to meet Goal 1 - Broadband, http://www.fcc.gov/omd/strategicplan/strategicplan2003-2008.pdf.

[6] In this *Notice*, the term port is used for the purpose of delimiting the territorial sea; the outermost permanent harbor works that form an integral part of the harbor system are regarded as forming part of the coast. Off-shore installations and artificial islands shall not be considered as permanent harbor works. United Nations Convention on the Law of the Sea (UNCLOS), Territorial Sea and Contiguous Zone, 11, available at http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm.

[7] ESVs can provide data rates to ships of over 2 Megabits-per-second, and permit crew and passengers to place telephone calls, browse the Internet, watch television, and listen to radio in real-time.

[8] *See* Federal Communications Commission Strategic Plan FY 2003-FY 2008, page 14, Means and Strategies to meet Goal 2 – Spectrum, http://www.fcc.gov/omd/strategicplan/strategicplan2003-2008.pdf.

[9] *Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in Bands Shared with Terrestrial Fixed Service*, Notice of Inquiry, 17 FCC Rcd 2646 (2002) (*Notice of Inquiry*).

[10] *Id.*

the bands identified for ESV operations, the Commission solicited comment on potential methods for licensing ESVs that would help ensure that ESV operations would not cause harmful interference to, nor limit the growth of, terrestrial fixed services operating in the same band.

5. In this *Notice*, we seek comment on methods for authorizing and licensing ESVs that are consistent with the WRC-03 outcome and that would also help ensure that ESV operations would not cause harmful interference to terrestrial and satellite operations. First, we discuss and seek comment on rules and procedures to license ESV networks that consist of hub earth stations and ESVs for operation over geostationary satellite orbit (GSO) FSS satellites in the Ku-band. The ESV licensing procedure that we propose for the Ku-band would permit blanket licensing of an ESV network similar to the licensing rules for very small aperture terminals (VSATs) that currently operate in the Ku-band.

6. Second, we discuss and seek comment on rules and procedures to license ESV networks that consist of hub earth stations and ESVs for operation over GSO FSS satellites in the C-band. The Commission has allocated the C-band spectrum to FS and FSS operators to share C-band spectrum on a co-primary basis.[11] Unlike traditional FSS earth stations, stations on vessels are, in many cases, operational while a vessel is in motion, which makes it more challenging for ESVs to share use of the spectrum with FS stations. Moreover, the C-band spectrum is used by public safety and other FS stations that provide important communications services within the United States. Ensuring protection from harmful interference to these and other incumbent fixed services, including prompt resolution of any interference complaints that may arise, are important aspects of this proceeding. For ESV operations in the C-band, where it is necessary to consider potential harmful interference between FS and FSS operations, we seek comment on two methods for licensing ESVs: (1) a Non-Coordination Approach and (2) a Coordination Approach. The proposed Non-Coordination Approach would provide a short-term license for C-band ESV operations with specific conditions imposed to facilitate the identification and elimination of harmful interference in the event that an ESV causes interference to a FS system. The proposed Coordination Approach would require, among other things, that ESV operators coordinate their operations prior to receiving a license and meet certain technical criteria designed to protect FS operators. Under either method, ESV use would be prohibited from causing harmful interference to, claiming interference protection from, or otherwise imposing constraints on the operation or deployment of other radio services in the C-band.

7. This *Notice* seeks comment on licensing procedures for ESVs with a goal of maximizing the efficient use of both Ku-band and C-band spectrum, and respecting the expectations of incumbent operators. Our proposals are designed to encourage ESVs to utilize the Ku-band to the maximum extent possible.

II. BACKGROUND

A. Current ESV Use

8. In December 1991, Crescomm Transmission Services, Inc.[12] (Crescomm) filed a Petition for Rulemaking to license ESVs to communicate with land-based fixed and temporary-fixed satellite earth

[11] 47 C.F.R. § 2.106.

[12] Crescomm has since changed its name to Maritime Telecommunications Network, Inc. (MTN).

stations in the C-band and Ku-band.[13] In its petition, Crescomm proposed to provide mobile telecommunications services to vessels via satellite. Crescomm requested a blanket earth station license for VSAT earth stations on vessels.[14] In 1996, the International Bureau (the Bureau) and the Office of Engineering and Technology (collectively, the Bureaus) issued the *Crescomm Order* and granted waivers of the Commission's rules to Qualcomm, Inc. (Qualcomm)[15] and MTN to provide mobile-satellite service (MSS) using bands allocated to FSS and terrestrial FS.[16] The authorization placed conditions on the licenses, requiring them to protect against interference to, and accept interference from, other services or operations in the bands and requiring any ESVs in the C-band to operate beyond 100 kilometers from the U.S. coast in order to limit potential interference to FS operations.[17]

9. In 1997, the Bureau granted Special Temporary Authority (STA) to MTN for the operation of 45 earth terminals at sea and in or near four U.S. ports for six months. The Bureau granted MTN's requests for extensions of the STAs several times from 1997 through 1999. In January 2000, MTN requested authority to increase the number of vessels equipped with its ESVs from 45 to 150 and the number of ports authorized for ESV use from four to seventeen.[18] In its *MTN Order*, the Bureau declined to grant STAs for the MTN ships that were foreign-registered and granted the request only as it pertained to U.S.-flagged ships.[19] The Bureau permitted the MTN network to operate ESVs on six U.S. Navy vessels to and from seventeen ports on a non-harmful interference basis and also permitted MTN to operate ESVs at sea beyond 100 kilometers from the U.S. coastline.[20] In declining to grant STAs for the foreign-registered vessels, the Bureau stated that, pursuant to Section 306 of the Communications Act, the Commission does not have jurisdiction to license ESVs on foreign vessels.[21] Thus, currently, earth stations on board vessels of foreign registry are not licensed under any Commission authority.

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[13] Crescomm Transmission Services, Inc., Petition for Rule Making Request for Pioneer Preference (filed December 12, 1991) (*Crescomm Petition*) at 1.

[14] *Crescomm Petition* at 1.

[15] Qualcomm filed a request for waiver of the Table of Frequency Allocations to allow it to provide satellite-based communications to ships in the 12/14 GHz band, via a satellite-based land mobile data system known as OmniTRACS. *See Mobile Satellite-Based Communications Services by Crescomm Transmission Services, Inc., and Qualcomm Incorporated,* Order, 11 FCC Rcd 10944, 10946-47, ¶7 (Int'l Bur./OET, 1996) (*Crescomm Order*).

[16] *See Crescomm Order*, 11 FCC Rcd at 10948, ¶9.

[17] *Crescomm Order*, 11 FCC Rcd at 10949, ¶13.

[18] *Maritime Telecommunications Network, Inc.,* Order, 15 FCC Rcd 23210, 23212, ¶5 (Int'l Bur., 2000) (*MTN Order*). The seventeen ports are: Bremerton, WA; Everett, WA; Jacksonville, FL; Norfolk, VA; San Diego, CA; Ft. Lauderdale, FL; Juneau, AK; Ketchikan, AK; Key West, FL; Los Angeles, CA; Miami, FL; New Orleans, LA; Port Canaveral, FL; San Juan, PR; Skagway, AK; St. Thomas, VI; Tampa, FL.

[19] *MTN Order*, 15 FCC Rcd 23210. The Commission also began to investigate ways to coordinate transmissions from these foreign-registered ships or to have separate bi-lateral agreements with the countries involved in order to protect domestic terrestrial fixed services.

[20] *MTN Order*, 15 FCC Rcd at 23217, ¶16.

[21] *MTN Order*, 15 FCC Rcd at 23214-15, ¶9. Under Section 306 of the Communications Act the Commission does not have authority to license earth stations on ships of foreign registry. 47 U.S.C. § 306.

10. In July 2001, MTN requested authority to operate ten ESVs on U.S.-flagged vessels in the C-band, while in the process of converting the C-band ESVs to the Ku-band.[22] The authorization term of that STA has since expired. More recently, the Bureau granted MTN's request to use ten ESVs on U.S.-flagged vessels in the Ku-band on a non-harmful interference basis.[23]

11. ESV operations have resulted in the development of methods for avoiding harmful interference to FS operations in the C-band. Unlike traditional FSS earth stations, most of the earth stations that MTN and similar operators use are capable of operating on ships that are moving. The use of in-motion earth stations in the C-band falls outside of established FCC coordination procedures for spectrum sharing between FS and FSS operators. Instead of coordinating an FSS transmitter at a known location, ESV operators must identify and coordinate with FS stations in an area that changes as the ESV moves through a particular waterway. When vessels are far out to sea, interference between the two types of operations is unlikely because of the distance that separates the ESV from the land-based FS licensees' operations. When ESVs approach and enter ports or traverse shipping channels that hug the nation's coastline, however, the potential to interfere with terrestrial FS receivers increases. While ESV operators are capable of removing or significantly limiting the potential for interference by using bands that do not have FS operations, or only very limited FS operations, such as portions of the Ku-band, many ESV operators continue to state a preference for C-band spectrum. MTN asserts that it uses the C-band because C-band FSS satellites have a broader coverage area than Ku-band FSS satellites, permitting communications over a greater area from a single satellite. MTN further claims that C-band is the only portion of the commercially available FSS spectrum that offers sufficient bandwidth for the type of services MTN provides on a global basis.[24]

B. ESV Coordination Efforts

12. Starting in February 1997, the National Spectrum Managers Association (NSMA) tried to develop methods for coordinating ESVs with terrestrial fixed microwave stations.[25] ESV representatives, terrestrial fixed microwave equipment manufacturers, and frequency coordinators met over a period of the next three years reaching agreement on many aspects of the coordination process, such as the administrative details of the Prior Coordination Notices to be sent to potentially affected parties; coordination methodology and the use of criteria for static ESVs, *i.e.* ESVs in ports; and a methodology known as the critical contour point methodology developed by MTN, for analyzing interference from an ESV in-motion entering or leaving a port. Consensus was not reached, however, on the interference objectives that would be applied for the analysis of ESVs in-motion.

13. In May 2000, the World Radiocommunication Conference in Istanbul (WRC-2000) adopted

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[22] Letter from Eliot J. Greenwald, Counsel for MTN, to Magalie Roman Salas, Secretary, FCC (dated July 6, 2001).

[23] SES-STA-20021113-02003, Maritime Telecommunications Network, Inc., Granted for 11/19/02 - 1/19/03. In addition to the ten vessels for which the STA was granted, MTN states that it currently provides broadband service from FSS satellites to more than 100 non-U.S.-registered vessels and ten U.S.-registered vessels worldwide through specialized FSS earth station equipment on board vessels. MTN comments at 6. According to MTN, these ships use stabilized platforms to keep the antenna pointed at the correct satellite in order to compensate for ocean movement.

[24] MTN Comments at 10-11. We seek comment later in this *Notice* on satellite transponder availability in the C-band and Ku-band across the oceans and along the U.S. coastline.

[25] *See, generally,* NSMA Reply Comments at 1-4.

Resolution 82, which recognized the ability of ESV licensees to operate using FSS networks.[26] Passage of this Resolution prompted the International Telecommunication Union's Radiocommunication Sector (ITU-R) to study the potential for interference from ESVs to FS operations. In October 2001 and April 2002, the ITU-R Joint Working Party 4-9S (JWP-4-9S), which studied FSS and FS sharing issues, developed several recommendations pertaining to ESV operations.[27] These recommendations described methods that can be used to minimize interference to FS services from ESV operations.

14. Prior to WRC-03, the United States developed a proposal under WRC-03 Agenda Item 1.26 setting forth a method for permitting and licensing ESVs. Specifically, the United States proposed that the Conference adopt a footnote to the International Table of Frequency Allocations stating that administrations operating earth-stations on board vessels in the bands 5925-6425 MHz and 14-14.5 GHz shall take all practicable steps to comply with Resolution 82 and that such use shall not cause harmful interference to, claim protection from, or otherwise impose constraints on the operation or development of other radio services operating in the 5925-6425 MHz and 14-14.5 GHz bands. The United States also proposed, among other things, 300 kilometers for the C-band and 125 kilometers for the Ku-band as minimum distances from the coastline for ESV frequency coordination[28] and that ESV systems should (1) include a means of identification and location; (2) have a maximum necessary bandwidth per vessel of 2.4 megahertz; (3) be equipped to enable the ESV licensing administration to verify earth station performance; and (4) be equipped to terminate ESV transmissions immediately upon request by a concerned administration whose services may be affected.[29] To ensure that ESVs operating in FSS networks would be consistent with earth stations already operating in these networks in these bands, to ensure efficient use of the GSO, and to provide protection to existing radio services, the United States proposal included maximum off axis emitted isotropic radiated power (EIRP) limits, minimum antenna

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[26] Provisions Relating to Earth Stations Located on Board Vessels which Operate in Fixed-Satellite Service Networks in the Bands 3700-4200 MHz and 5925-6425 MHz, WRC-2000, Resolution 82 (Resolution 82) (*noting* "'that ESVs may operate in FSS networks in the bands 3700-4200 MHz and 5925-6425 MHz under No. 4.4 of the Radio Regulations and shall not claim protection from, nor cause interference to, other services having allocations in the band").

[27] *See* ITU-R Recommendation SF.1585 Example Approach for Determination of the Composite Area Within Which Interference to Fixed Service Stations from Earth Stations on Board Vessels When Operating in Motion Near a Coastline Would Need to be Evaluated http://www.itu.int/rec/recommendation.asp?type=folders&lang=e&parent=R-REC-SF.1585; ITU-R Recommendation SF. 1650 The minimum distance from the coastline beyond which in-motion earth stations located on board vessels would not cause unacceptable interference to the fixed service in the bands 5 925-6 425 MHz and 14-14.5 GHz http://www.itu.int/rec/recommendation.asp?type=folders&lang=e&parent=R-REC-SF.1650; ITU-R Recommendation SF. 1649 Guidance for Determination of Interference from Earth Stations on Vessels (ESVs) to Stations in the Fixed Service When the ESV Is Within the Minimum Distance http://www.itu.int/rec/recommendation.asp?type=folders&lang=e&parent=R-REC-SF.1649; ITU-R Recommendation SF.1648 Use of Frequencies by Earth Stations on Board Vessels Transmitting in Certain Bands Allocated to the Fixed-Satellite Service http://www.itu.int/rec/recommendation.asp?type=products&lang=e&parent=R-REC-SF;

[28] United States Proposal for Agenda Item 1.26 of the WRC-03, http://www.itu.int/ITU-R/conferences/wrc/wrc-03/summary/index.asp?AgendaItem=1&AgendaSubitem=26&AgendaSubSubitem.

[29] United States Proposal for Agenda Item 1.26 of the WRC-03, http://www.itu.int/ITU-R/conferences/wrc/wrc-03/summary/index.asp?AgendaItem=1&AgendaSubitem=26&AgendaSubSubitem.

diameters (2.4 m for C-band, 1.2 m for Ku-band), a 2.4 megahertz bandwidth limitation, maximum transmitter power spectral density limits, and a 0.2 degree pointing accuracy requirement.

15. At WRC-03, a footnote was added to the International Table of Frequency Allocations stating that in the 5925-6425 MHz and 14.0-14.5 GHz bands ESVs may communicate with space stations in the FSS.[30] The Conference established the minimum distance from the low-water mark as officially recognized by the coastal state beyond which ESVs can operate without the prior agreement of any administration as 300 km in the 5925-6425 MHz band and 125 km in the 14-14.5 GHz band.[31] These minimum distances are conditioned upon technical limitations, such as antenna size and off-axis EIRP limits, that are discussed in greater detail below.[32] The Conference also encouraged administrations to cooperate with each other in reaching agreement on the use of ESV systems.[33] The final Conference language states that national practices, as well as applicable Recommendations of ITU-R, may be used in reaching frequency usage arrangements.[34]

16. While largely tracking the U. S. proposal, the WRC-03 decision did not specifically state that such use shall not cause harmful interference to, claim protection from, or otherwise impose constraints on the operation or development of other radio services operating in the 5925-6425 MHz and 14-14.5 GHz bands. The Conference also did not adopt the U. S.' position with respect to the 2.4 megahertz bandwidth limitation. Rather, the Conference adopted limitations on maximum EIRP spectral density towards the horizon and maximum EIRP towards the horizon. Nevertheless, to resolve any ambiguity in the regulatory status of ESV operations that might be associated with the footnote language adopted by WRC-03, and because the 5925-6425 MHz band is used extensively for FS in the United States, we propose to adopt a footnote to the U.S. Table of Frequency Allocations in the 5925-6425 MHz band that states that ESV use shall not cause harmful interference to, claim protection from, or otherwise impose constraints on the operation or development of other radio services operating in the 5925-6425 MHz band. With respect to ESV operations in the 14-14.5 GHz band, because of the light use of the band by terrestrial services, we propose to adopt a footnote to the U.S. Table of Frequency Allocations that clarifies that ESV operations in that band are considered an application of the FSS and subject to the same regulatory status as other FSS operations. We also seek comment on whether to adopt the U.S. proposal regarding the 2.4 megahertz bandwidth limitation and whether the limitations on maximum EIRP spectral density towards the horizon and maximum EIRP towards the horizon adopted by WRC-03 should be adopted.

C. Notice of Inquiry

17. In its 2002 *Notice of Inquiry,* the Commission sought comments on issues surrounding the allocations for and licensing of ESVs.[35] The *Notice of Inquiry* focused on the bands that can best

[30] ITU RR 5.457A (WRC-03).

[31] Footnote 5.457A specifies in Annex 1 that any transmissions from ESVs within the minimum distances shall be subject to the prior agreement of the concerned administration(s). Recommendation 37 recommends operational procedures for ESV use that could help achieve such agreements.

[32] ITU-R Resolution 902 (WRC-03) Annex 1 and Annex 2.

[33] ITU-R Resolution 902 (WRC-03).

[34] ITU-R Recommendation 3737, Annex 1.

[35] *Notice of Inquiry*, 17 FCC Rcd 2646.

accommodate ESVs and on how to prevent interference to terrestrial FS licensees when ESVs operate in those bands in which FS is co-primary.

18. ESV proponents responding to the *Notice of Inquiry* support licensing ESVs in both the C-band and Ku- band[36] and urge the Commission to establish a regulatory framework for ESVs.[37] Several commenters state that by coordinating their operations with FS operators, ESVs provide service to vessels in shared bands without causing interference to FS operations.[38] These commenters add that ESV operations allow for more efficient use of FSS spectrum.[39] Furthermore, several commenters generally support the Recommendations developed in the ITU-R as the result of the studies prompted by passage of Resolution 82 by WRC-2000.[40] Some commenters assert that coordination distances from the coast need to be shorter than those required by the ITU Radio Regulations. Specifically, commenters state that off-shore distances of 300 kilometers for C-band and 125 kilometers for Ku-band are greater than necessary for ESV operations in the United States because of particular characteristics of FS and FSS operations in the United States.[41] Four commenters advocate a permanent, flexible licensing mechanism for ESV operations with minimal restrictions.[42] Several commenters also support fifteen-year license terms for ESVs, consistent with the license term for other earth stations.[43]

19. The Fixed Wireless Communications Coalition[44] (FWCC) opposes the licensing of ESVs in the C-band because of concerns about the potential for ESVs to interfere with and affect the growth of FS systems.[45] The FWCC urges the Commission to abandon any further authorization of ESV operations in the C-band for in-motion activities within 300 kilometers of the U.S. coast.[46] Instead, FWCC urges the Commission to require that all ESV operations be conducted using C-band frequencies on the high seas and Ku-band frequencies close to the U.S. coastline. Except for one case of known interference, when an

[36] MTN Comments at 10; Boeing Comments at 3; Intelsat Comments at 2; Inmarsat Comments at 4; SIA Comments at 3.

[37] MTN at 1; Boeing Comments at 3; Inmarsat Comments at 2; SIA Comments at 2; Intelsat Comments at 2.

[38] MTN at 1; Boeing Comments at 3; Inmarsat Comments at 2; SIA Comments at 2; Intelsat Comments at 2.

[39] MTN Comments at 7-8; Boeing Comments at 1; Harris MCS Comments at 2.

[40] MTN Comments at 17; FWCC Comments at 13; Boeing Comments at 1-2; Harris MCS Comments at 5; Intelsat Comments at 2; NSMA Reply at 3; Inmarsat Comments at 3.

[41] MTN Reply at 20; Inmarsat Comments at 5-6; Intelsat Comments at 4.

[42] MTN Comments at 20; Harris MCS Comments at 3: SIA Comments at 3; Intelsat Comments at 4.

[43] MTN Comments at 21; SIA Comments at 3; Intelsat Reply at 8.

[44] The FWCC is a coalition that includes trade associations whose members operate stations in the FS and commercial mobile radio services; manufacturers of FS equipment; frequency coordinators; and other members including state and local law enforcement agencies; electric, gas, and water utilities; railroads; pipeline and petroleum exploration companies.

[45] FWCC Comments at 2-3. FWCC states that many FWCC members operate FS links in port cities and coastal locations using the C-band, which is shared with FSS. FWCC Comments at 1.

[46] FWCC Comments at 13-14.

ESV was operating out of band, FWCC has complained that it has had a difficult time determining whether MTN's ships are causing interference to FS facilities because FS operators do not have a way to positively identify and determine where MTN's ships are at any given time.

20. While urging the Commission to bar C-band ESVs from operating close to the coast, the FWCC states that, in the alternative, if the Commission finds it necessary to authorize close-to-shore, in-motion ESV operations in the C-band, the Commission should adopt a rigorous regulatory regime with the goals of preventing interference in advance; identifying the source and quickly eliminating any interference that does occur; and preserving the availability of the 6 GHz band for future growth of the fixed services.[47] Some of the conditions and restrictions FWCC recommends are: (1) a minimum 300 kilometer distance from the coast requirement for C-band operations; (2) a method for determining who and where the ships are at any given time; (3) antenna specifications; (4) limits on the maximum ESV transmitter power; (5) prior coordination; and (6) short license terms.[48] We address these comments below and seek comment on a regulatory framework for ESV networks that meets the needs of FS and ESV operators.

21. We recognize that ESV operations on-board moving vessels in the FS spectrum present novel challenges to the operators of both services. The record established in this proceeding will allow the Commission to determine the effect of authorizing ESVs and will facilitate the development of any future rules. Thus, in an effort to generate solutions to these novel challenges, throughout this proceeding we make proposals about the status of ESV operations, and, then, we follow our proposals by seeking comment on alternatives to our proposals. Our goal is to develop approaches for licensing ESVs that would maximize the efficient use of both Ku-band and C-band spectrum while balancing the expectations of incumbent operators to operate free from harmful interference and to have growth potential in the bands.

III. DISCUSSION

22. We seek comment on rules for allocation and procedures for licensing ESVs. We intend that, if adopted, such a licensing program would support the deployment of ESV networks to the benefit of the American public without adversely affecting the operation and continued growth of incumbent radio services. We also intend that a licensing program would ensure that incumbent radio services are protected against harmful interference. To that end, we seek comment from individual operators of incumbent radio services in both the C- and Ku-bands. In particular, we seek comment from terrestrial operators in the Ku-band, from whom we did not receive any comments to the *NOI*. The proposals that we make in this *Notice* could affect the terrestrial operators in the C- and Ku-bands, and, we would like to have comments that address any issues that may be raised from their perspective. We request comments on the proposals addressed in this *Notice*. Further, we encourage all commenters to address any other issues that may not have been identified in this *Notice*. The record established in this proceeding will allow the Commission to determine the impact of authorizing ESVs and will facilitate the development of any future rules.

23. We believe that ESV networks would provide public benefit by delivering broadband services to consumers at locations where those services would otherwise be unavailable to them. ESVs provide a means for crew and passengers to place telephone calls, send and receive e-mail, browse the

[47] FWCC Reply at 2.

[48] FWCC Comments at 10-13.